

appearance in a hypertrophic rudimentary anther which under their stimulation, forms the ordinary dehiscence lines, it happens that when the spores of the *Ustilago* are ripe, they are distributed by the same means and agencies which commonly distribute the *Lychnis* pollen. This is of clear advantage to the fungus for it is thus sown upon young buds as well as upon stigmatic areas. The whole series of phenomena is one which indicates in very interesting fashion how intimate and remarkable may be the relation between host and parasite.—CONWAY MACMILLAN.

### The behavior of the pollen-tube of gymnosperms.

In a recent paper,<sup>1</sup> preliminary to a more complete research Belajeff publishes some suggestive observations regarding the divisions which take place in the pollen-tube of *Taxus baccata*.

It is well known that one or more cells are commonly cut off from the body of the pollen grain early in its development. Many have considered this cell or cells as representing a male prothallium, and Strasburger states that they have to do with the formation of the pollen tube, and after that have no further part to play. Belajeff, however, was led by his researches into the antheridia of the higher cryptogams and the pollen tubes of the angiosperms to think that it was not the large cell of the pollen grain of gymnosperms, but the small ones which have to do with fertilization. He therefore examined with great care the processes in *Taxus baccata* with the following result:

In this plant the contents of the pollen grain divides into two cells one large and one small. The larger one, *a*, produces the tube, the nucleus and other contents wandering to the apex. The smaller cell *b*, which remains behind, then divides into two by a partition transverse to the axis of the tube. The anterior of these two, *b'* then wanders toward the apex of the tube while the posterior *b*, becomes disorganized. Its nucleus however also wanders toward the apex, usually passing the anterior cell. The apex of the pollen tube now increases in size considerably as does also the cell *b'*. The nucleus of this now divides into two, one spherical, and the other lenticular. When fertilization occurs the wall of the pollen tube and the very delicate wall of the cell *b'* disappears and the

<sup>1</sup> *Berichte der deutschen bot. Gesellschaft* ix. 280. (1891.)

spherical nucleus of  $b'$  fuses with the nucleus of the egg cell of the archegonium.

While it is hardly safe to generalize from such limited observations (for so far they have been confirmed only on *Juniperus* and that but partially) nevertheless the observations accord much better with what we should expect from analogy with lower and higher plants. If these observations are confirmed by more extended study the pollen tube must be looked upon as the prothallium, while the small cells constitute the antheridium. The one which travels to the apex of the tube must be the mother cell of an antherozoid, to which the spherical nucleus would correspond. Perhaps on account of the imperfect division of  $b'$  it would have to be considered as more primitive still, being the homologue of the cells from which the antherozoid mother-cells arise.—R.

---

### BRIEFER ARTICLES.

Notes on pollination.—I. The sandy hills, old trees and fences on the north shore of Long Island are covered with *Ampelopsis quinquefolia* Michx. The numerous small, greenish-yellow flowers are quite conspicuous in contrast with their background of green leaves. On the morning of July 22d, there were twenty-two flowers open on one cyme, the pollen-covered stamens outspread, the erect stigma occupying the flower center. Numerous visitors—honey bees, humble-bees, hornets, Sphecidae, other Hymenoptera small and large, and Diptera—were either sucking the nectar which is exposed in the base of the flower and accessible to the shortest tongues, or collecting or eating the pollen. Almost all of them touched both stamens and stigma before leaving a flower. Early in the afternoon of the same day stamens and petals had fallen from all of these flowers but the visitors continued their visits as industriously as ever—of course, now only sucking nectar.

On the morning of July 23d, no more flowers had opened, and there were none with stamens on this whole plant or on any of the plants near by. The number of visitors was diminished. Early in the afternoon many new flowers had opened on all the plants and insects abounded. July 24th, at 8 A. M., after a heavy rain, very few stamens and petals remained. At 11 A. M. there were many newly opened flowers. July 25th, at 2 P. M., no stamens.